

Remarks

Claims 10, 13 and 17 have been amended to more clearly define the invention recited therein. In each of these claims the magnesium content is now specified as “0.1 to 0.4%.” This range is within the originally disclosed and claimed broad range of “0.1 to 0.6 percent magnesium.” And the upper limit of 0.4 percent magnesium also is the nominal value of the specific example of the alloy disclosed in paragraph 0031 of the specification.

The Rejections

Claims 1 and 4 (5?) are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 58-042748A (JP '748). Applicant's attorney assumes that the Examiner may have intended that this rejection be applied to claim 5. Claim 5 is generally parallel to claim 1 as regards composition of the aluminum casting alloy. Otherwise, there is no specific rejection applicable to claim 5.

Claims 2-4, 6-14 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 57-079140A (JP '140), optionally in view of “ASM Handbook: Vol. 15 Casting” pp 751-752.

The Examiner is respectfully requested to reconsider both groups of rejections for the following reasons.

The identification of allowable subject matter in dependent claims 15 and 19 is gratefully acknowledged. Rather than so limiting independent claim 9 at this stage of the prosecution of this application, Applicant chooses to argue for the patentability of claim 9 in its present form. This argument is presented following the discussion of the patentability of claims 1-8.

Claim 1 recites the constituents and their proportions of an aluminum alloy for a cast engine block. The alloy is castable, has suitable strength for engine applications, and provides resistance to piston wear so that a cylinder block does not require iron liners or special cylinder wall coatings. Claim 5 recites the cast cylinder block for an internal combustion engine when formed of the alloy recited in claim 1. As taught in paragraph 0011 of the specification, the alloy is suitable for casting into an

engine block by any of the common casting methods including bonded sand casting, lost foam casting, precision sand casting, permanent and semi-permanent mold casting and die casting. It is taught that, with this alloy, die casting may require iron content at the higher end of the specified range for iron. The claim 1 aluminum based alloy requires specified ranges of silicon, iron, manganese, magnesium and strontium. And the proportion by weight of manganese to iron is demonstrated to be important in obtaining good physical properties, such as strength and resistance to piston ring scuffing, in the fluid castable alloy. The recited ranges of manganese and iron accommodate the required weight proportions. The prior art does not suggest such an alloy composition or cast engine cylinder block.

The JP '748 disclosure is of a die castable aluminum based alloy that contains silicon, magnesium and iron. Additionally, it contains one or two of the four elements: manganese, zirconium, chromium and titanium. The disclosure of this die casting alloy does not require any manganese to be present and, obviously, it does not require a specific ratio of manganese to iron in the alloy composition. The '748 disclosure does not require strontium as part of the alloy. Not all die casting alloys make engine blocks. The '748 composition is not disclosed as being suitable for engine blocks, and clearly the '748 composition will not make the claim 5 block.

JP '748 would not lead one skilled in the art to the content of claims 1 or 5 (or claim 4, if claim 4 was intended to be rejected here). The only possible way to arrive at the claim 1 composition, starting with JP '748, is to have the claim 1 composition in hand so that manganese and strontium can be included and the Mn/Fe balance established. That is not a proper basis for the rejection of claims 1 and 5. The rejection should be reconsidered and removed.

The rejection of claims 2-4, 6-14 and 16-18 as unpatentable over JP '140 should also be reconsidered and removed.

1. The '140 reference discloses an alloy containing antimony and not strontium. This is contrary to the specific teaching of paragraph 0009 of the subject application. The function of strontium in the claimed casting alloys is clearly specified. Possible substitutes or complementary additives include sodium, or rare earth metals,

especially cerium, lanthanum and neodymium. Applicant has specified equivalents for strontium and antimony is not listed. The Examiner can not arbitrarily state that antimony is an equivalent to support the rejection of fifteen claims. The ASM pages do not (and can not) state that antimony is a universal equivalent of strontium for eutectic Al-Si phase modification in aluminum alloys. Indeed, the ASM states that antimony produces a different modified eutectic structure and that it is not compatible with other modifying elements.

2. The '140 reference requires a magnesium content that is above the claimed Mg range of claims 4, 8, 10, 13, 14, 17 and 18.

3. The '140 reference is an alloy for a piston. Die cast aluminum pistons (and all pistons) have piston rings of special wear resistant composition for reciprocating sliding on the cylinder walls of an engine block casting. The '140 alloy is not disclosed as suitable for casting engine blocks and Applicant's specification certainly does not teach that some piston alloy is suitable for liner-free engine blocks. This reference is not applicable to claims 2-4 or 6-8 because they are limited to engine block applications.

4. Each rejected claim has a limitation on the weight ratio of manganese to iron. The specification discloses and exemplifies the importance of the ratio, especially for cylinder block castings. Claims 3, 7, 11, 14 and 18 further relate the Mn/Fe ratio to copper or nickel content. The Mn/Fe ratio is not a disclosed concern with respect to the '140 reference piston alloy and its heat treatment. The rejected claims recite Mn and Fe ranges that accommodate the required weight ratios of these elements. The fact that the '140 reference discloses iron and manganese ranges that somewhat overlap ranges in the rejected claims does not make obvious the claimed combination of manganese and iron content and their weight ratios.

It is submitted that each and all of claims 1-19 are patentable over the JP '748 and JP '140 disclosures. Accordingly it is requested that the rejections of these claims be reconsidered, that they be allowed and this case passed to issue.

Respectfully Submitted,

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